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PATENT APPLICATION

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IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): GARCIA et al.

Application No.: 09/941,884

Filing Date: Aug 28, 2001

Title: DIAGNOSTIC FOR VISUAL DETECTION OF MEDIA ADVANCE ERRORS

Confirmation No.: 7849

Examiner: NGUYEN, LAM S.

Group Art Unit: 2853

Mail Stop Appeal Brief-Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF REPLY BRIEF

Sir:

Transmitted herewith is the Reply Brief with respect to the Examiner's Answer mailed on Feb 10, 2005. This Reply Brief is being filed pursuant to 37 CFR 1.193(b) within two months of the date of the Examiner's Answer.

(Note: Extensions of time are not allowed under 37 CFR 1.136(a))

(Note: Failure to file a Reply Brief will result in dismissal of the Appeal as to the claims made subject to an expressly stated new grounds of rejection.)

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Respectfully submitted,

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PATENT
60003206-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Garcia et al.

Serial No. 09/941,884

Filed: 08/28/2001

For: DIAGNOSTIC FOR VISUAL DETECTION OF MEDIA ADVANCE ERRORS

Art Unit: 2853

Examiner: Nguyen, Lam S.

REPLY BRIEF IN RESPONSE TO NEW GROUND OF REJECTION
REQUEST FOR MAINTAINING APPEAL
(RULE 41.41)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal was taken from the Office's final rejection of Claims 1, 3-10, 12-18 and 22 mailed June 21, 2004, in the subject application. Appellants' appeal brief was filed November 22, 2004. In response to the appeal brief, in an office action mailed February 10, 2005 (the "Office action"), the Examiner withdrew the final rejection, and asserted new grounds of rejection. Appellants elect to maintain the appeal, pursuant to Rule 41.41, and submit this reply brief addressing the new grounds of rejection.

The format of this brief follows the direction given in the Office's answer to comment 72, regarding the proposed new Rules of Practice before the Board of Patent Appeals and Interferences, published in the Federal Register on August 12, 2004.

I. STATUS OF ALL THE CLAIMS.

Claims 1-22 were filed with this application. During the course of prosecution before the Primary Examiner, Claim 19 was cancelled. Claims 1-18 and 20-22 in their present, amended form appear in Appendix 1 to the Appeal Brief. Claims 2 and 11 have been allowed. Claims 1-18 and 20-22 are the only claims pending in this case.

Claims 1, 3-10, 12-18 and 20-22 are at issue in this appeal. The grounds of rejection set out in the Final Rejection have been withdrawn, and new grounds of rejection applied, in the Office Action.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL.

The grounds of rejection to be reviewed on appeal are:

(I) whether Claims 1, 3-5, 10 and 12-14 are unpatentable under 35 USC 103(a) over Gast et al. ("Gast") (US 6,076,915) in view of Dunand (US 6,398,334);

(ii) whether Claims 7 and 16 are unpatentable under 35 USC 103(a) over Gast In view of Dunand and further in view of Maeda et al ("Maeda") (US 6,334,659);

(iii) whether Claims 8-9, 17-18 and 20-21 are unpatentable under 35 USC 103(a) over Gast In view of Dunand and further in view of Yen et al ("Yen") (US 6,334,659), and

(iv) whether Claims 6, 15 and 22 are unpatentable over Gast in view of Dunand and Takagi et al.

III. ARGUMENT.

A. The Requirements of 35 USC §103.

35 USC §103 requires that the invention as a whole must be considered in obviousness determinations. The invention as a whole embraces the structure, its properties and the problem it solves. In re Wright, 6 USPQ2d 1959, 1961 (Fed.Cir. 1988).

In order to provide a basis for obviousness, the applied references must be related to the subject matter of the invention in issue and must suggest (expressly or by implication) the combination of the invention in issue. In re Sernaker, 702 F.2d 989 (Fed.Cir. 1983).

Further, the combined teachings of the prior art references should suggest the advantage of combining the teachings. In re Sernaker, supra, at 995-996.

In determining the combined teachings of the applied references, the subject matter of the claimed invention must not be utilized to provide hindsight reconstruction of the applied references. As stated by the Court of Customs and Patent Appeals In re Shuman, 361 F.2d 1008 (CCPA 1966):

> It is impermissible to first ascertain factually what appellant did and then view the prior art in such a manner as to select from the random facts of that art only those which may be modified and then utilized to reconstruct appellants' invention from such prior art. 361 F.2d at 1012.

The Examiner bears the burden of establishing a prima facie case of obviousness based on the prior art. "... 'This burden can be satisfied only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.' The patent applicant may then attack the Examiner's prima facie determination as improperly made out, or the applicant may present objective evidence tending to support a conclusion of nonobviousness." In re Fritch, 23 USPQ 1780, 1783 (Fed.Cir. 1992).

Appellants submit that the Primary Examiner has not established prima facie that the claimed invention would have been obvious in view of the applied references, and that the references do not teach or suggest the claimed invention.

B. A Prima Facie Case of Obviousness Has Not Been Established.

For purposes of this appeal, appellants are content to stand on the differences between the claimed invention and the applied references discussed below, because these differences are sufficient to establish that a prima facie case of obviousness has not been established, and the applied references do not teach or suggest appellants' invention. Appellants do not concede, however, that other differences do not exist.

Claims 1, 3-5, 10, 12-14

Claims 1, 3-5, 10, 12-14 stand rejected as being unpatentable under 35 USC 103(a) over Gast in view of Dunand. This ground of rejection should be reversed on the grounds that a prima facie case of obviousness has not been established, and the applied references do not teach or suggest the claimed subject matter.

Gast describes a method for calibrating paper advance distances, at 9:33-10:49. A set of test patterns is printed, each having a first portion and a second portion, using different nozzles and with a media advance between printing the first and second portions. Each test pattern is printed with a media advance distance that is different from the media advance distances for the other test patterns. An optical sensor scans the test patterns and identifies the pattern with the highest reflectance, and corresponds to a best paper advancement distance. This distance is selected for the calibrated advancement distance.

Dunand describes a process for compensation of a defect in the advance of a print substrate by modifying the arrival position of ink droplets with a variable electrical charge on the substrate. Each band of droplets is printed with a mark on the margin or edge of the substrate, the substrate is advanced to print the next band, an algebraic difference is determined between a nominal theoretical position of the mark and the real position of the mark, a correction to the value

of the charge voltage to be applied to each droplet to compensate for the position error is determined, and the substrate correction is applied to each droplet in the next band, in addition to the nominal voltage. (Abstract) Thus, the printing of the mark is performed during printing of normal print jobs.

Claim 1:

Claim 1 recites a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

entering a diagnostic mode of the printing system in which mode normal printing jobs of the printing system are not printed;

printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

The Examiner states at page 3 of the Office action that Garcia does not disclose "wherein media advance error between the printing of the different areas is accumulated and the step of examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action."

Dunand does not disclose entering a diagnostic mode as recited in Claim 1. This is undisputed.

The Examiner alleges that Dunand discloses a "process for controlling printing medium advance in a printer, in which media advance error between printing of different areas *(band)* is accumulated and wherein if the accumulated media advance error is sufficiently objectionable, a corrective action is taken *(column 10, line 22-26: If the accumulated advance error reaches a half of a nominal advance, the program chooses to use the reference mark to print the next band)*." [Emphasis in the original]

Based on these allegations, the Examiner asserts that it would have been obvious to modify the printing process disclosed by Gast, such as accumulating media advance error and taking a corrective action if the accumulated error is

sufficiently objectionable as disclosed by Dunand. The Examiner asserts that the motivation of doing so would have been to provide a process to correct misalignment defects caused by the differences between the real advance of the substrate and its nominal advance as taught by Dunand at column 1, lines 7-11. Appellants respectfully disagree with the Examiner's characterization of the teachings of Gast and Dunand.

Gast describes printing a set of test patterns, each having a first portion and a second portion, using different nozzles and with a media advance between printing the first and second portions. Each of the test patterns is printed with a media advance distance that is different from the media advance distances for the other test patterns.

The Examiner asserts that it would have been obvious to modify Gast with features of Dunand. Appellants contend that this assertion is the product of prohibited attempted hindsight reconstruction.

The passage in Dunand quoted by the Examiner in support of the rejection (column 10, lines 22-26) has to do with the ability to distinguish between marks for odd and even rows, to determine whether the substrate movement has been blocked and preventing overlapping of one printed band over the next, or to determine which mark to use for printing the next band if two marks happen to be simultaneously visible to the detector. Dunand describes that the printed pattern of marks for odd and even rows is different, allowing the program to choose the reference mark to print during normal printing operations.

The Federal Circuit stated the law of obviousness in In re Kotzab, 55 USPQ 2d 1313, 1316-1317 (Fed.Cir. 2000):

> "A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field... Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one 'to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher,"... [citations omitted]
>
> Most if not all inventions arise from a combination of old elements... Thus, every element of a claimed invention may often be found

> In the prior art... However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention... Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant... Even when obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference...." [citations omitted]

Here, there has been no showing of a suggestion or motivation to modify Gast to arrive at the claimed invention. Dunand is cited as supplying teachings admittedly missing from Gast, yet there is no teaching or suggestion to modify Gast to arrive at the claimed subject matter. The Examiner alleges a motivation of modifying Gast to somehow accumulate media advance error and taking a corrective action if the accumulated error is sufficiently objectionable. "The motivation of doing so would have been to provide a process to correct misalignment defects caused by the differences between the real advance of the substrate and its nominal advance as taught by Dunand et al. (Column 1, lines 7-11)." The quoted passage is a statement of an intended process of Dunand, but it does not support a motivation to combine Gast and Dunand so as to arrive at the claimed subject matter.

Dunand teaches measuring the position of a mark printed during each swath of a print job, and correcting a voltage applied to drops during printing of the next swath. Dunand does not teach or suggest a diagnostic mode as recited in Claim 1. Gast describes a technique for calibrating the media advance system, printing several test patterns with different media advance distances, and using an optical sensor to detect which pattern and thus which media advance distance provides the best result. There is no suggestion of how Gast would be modified to include the missing features. Nor is there any reason to modify Gast as generally suggested by the Examiner. Appellants respectfully submit that the combination of references to form the grounds for the rejection is the product of improper hindsight reconstruction, using only appellants' specification as a blue print in an attempt to find isolated elements of the claimed invention.

Claim 3:

Claim 3 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

during a diagnostic mode of the printing system in which normal printing jobs of the printing system are not printed, printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas, wherein said different areas are nominally aligned along a horizontal line; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

A prima facie case of obviousness of the subject matter of Claim 3 has not been established, for reasons similar to those just discussed regarding Claim 1. Moreover, the Examiner alleges that Gast discloses printing different areas of a diagnostic pattern at different passes of one or more printheads with a controlled amount of media advances between the passes, wherein the different areas are nominally aligned along a horizontal line, referring to FIGS. 10-11 and 9:32 to 10:50. Appellants disagree; the patterns of FIGS. 10-11 do not have different areas printed which are nominally aligned along a horizontal line.

Claim 4:

Claim 4 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action, wherein said step of examining the diagnostic pattern is conducted visually by a user.

The rejection of Claim 4 should be reversed for reasons similar to those discussed above regarding Claim 1.

Claim 10:

Claim 10 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

entering a diagnostic multi-pass print mode in which mode normal printing jobs of the printing system are not printed;

printing different areas of a diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the passes to accumulate media advance error between the printing of the different areas; and

examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

The rejection of Claim 10 should be reversed for reasons similar to those discussed above regarding Claim 1.

Claim 12:

Claim 12 depends from Claim 10, and further recites that "said different areas are nominally aligned along a horizontal line." The rejection of Claim 12 should be reversed for reasons similar to those discussed above regarding Claim 3.

Claim 13:

Claim 13 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

entering a diagnostic multi-pass print mode;

printing different areas of a diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the passes to accumulate media advance error between the printing of the different areas; and

examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action, wherein said step of examining the diagnostic pattern is conducted visually by a user.

Similar considerations apply to Claim 13 as discussed above regarding Claim 4.

The Rejection of Claims 7 and 16

Claims 7 and 16 stand rejected under 35 USC 103 as being unpatentable over Gast in view of Dunand, as applied to Claims 1 and 10, and Maeda. This ground of rejection is respectfully traversed, for reasons discussed above regarding Claims 1 and 10. A prima facie case of obviousness has not been established.

Claim 7:

Claim 7 depends from Claim 1, and further recites that the step of printing different areas of a diagnostic plot includes:

applying a diagnostic multi-pass print mode mask, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed.

Claim 16:

Claim 16 depends from Claim 10, and further recites that the step of printing different areas of a diagnostic plot includes:

> applying a diagnostic multi-pass print mode mask, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed.

The Examiner agrees that Gast and Dunand do not disclose the features of dependent Claims 7 and 16. Maeda is cited as allegedly showing printing different areas of a diagnostic plot, by applying a diagnostic multi-pass print mode mask. Appellants respectfully disagree with the recitation of the alleged teachings of Maeda. The embodiment illustrated in FIGS. 7-10 of Maeda is directed to the problem of an ink drawing phenomenon causing bleeding, resulting from laying down a dot right next to a just previously deposited dot. By depositing respective dots in a checkerboard fashion, the ink drawing phenomenon is said to be avoided. FIGS. 10A-10D show the technique of checkerboard printing using respective mask patterns. See, Maeda at 10:35 to 11:54.

The passages of Maeda cited by the Examiner do not pertain to a "diagnostic plot," or a "diagnostic multi-pass print mode mask," but rather to techniques of printing to avoid bleed during normal print operations.

Because Gast and Dunand admittedly do not show the features of Claims 7 and 16, and because Maeda does not supply the missing teachings of these claims, a prima facie case of obviousness has not been established. Appellants respectfully submit that the combination of references to form the grounds for the rejection is the product of improper hindsight reconstruction.

The Examiner further states that it would have been obvious to include the applying of a diagnostic multi-pass print mode mask as allegedly disclosed by Maeda into the advance control process as disclosed by Gast, as modified,

and that the motivation for doing so is to reduce the formed bind pitch to less that paper transport width without increasing the number of scans, so that banding artifacts are imperceptible as taught by Maeda at 4:4-10. The problem addressed by Maeda has nothing to do with the problem of media advance errors, and so the motivation asserted by the Examiner would not lead one to the solution set out in Claims 7 and 16. The rejection of Claims 7 and 16 should be reversed.

The Rejection of Claims 8-9, 17-18, and 20-21

These claims are rejected as being unpatentable over Gast in view of Dunand and Yen. This rejection should be reversed, on the grounds that a prima facie case of obviousness has not been established, and the applied references do not teach or suggest the claimed invention.

Claim 8:

Claim 8 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

> during a diagnostic mode of the printing system in which normal printing jobs of the printing system are not printed, printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas, said printing different areas of a diagnostic pattern comprising applying a diagnostic multi-pass print mode mask, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels and a row width of w pixels, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed, and wherein said diagnostic print mode mask defines that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i); and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

Gast and Dunand have been discussed above, and does not teach or suggest the features of these claims, for reasons similar to those discussed above regarding Claim 10.

Yen is cited as allegedly disclosing "printing patterns including the first w/2 pixels in the row are printed in the same pass, and the last w/2 pixels in the row are printed in another pass, wherein said diagnostic print mode mask includes a row wherein said first w/2 pixels are printed in a first pass, and said last w/2 pixels are printed in a last pass of said plurality of passes (FIG. 6), and wherein said different areas are nominally aligned along a horizontal line (FIG. 3)." Appellants respectfully deny that Yen discloses the foregoing teachings.

The Examiner holds that it would have been obvious to "modify the diagnostic print pattern disclosed by Gast, as modified, such as the first w/2 pixels are printed in a first pass and the last w/2 pixels are printed in a last pass of said plurality of passes as allegedly disclosed by Yen et al. The motivation of doing so is to eliminate unpleasant banding artifacts caused by ink migration as taught by Yen et al. (Abstract)." Appellants respectfully disagree with this holding.

Yen discloses a mask pattern having 4 by 4 triangular tiling clusters, as shown in FIG. 6, which provide a balance between reduction of banding artifacts and increase in image granularity. The mask pattern is not described as a diagnostic print mask, nor does Yen describe printing a diagnostic pattern. The Examiner refers to FIG. 3 as allegedly disclosing "said different areas are nominally aligned along a horizontal line," yet FIG. 3 is said to be a printed image produced by an inkjet printer, effectively 60x magnified to show a banding phenomenon. (1: 61-65) It is not seen how this figure supports the Examiner's contentions.

Further, there appears no logical reason to modify Gast as suggested by the Examiner. Ink migration is not a problem addressed by Gast's media advance calibration. Here again, the rejection appears to be the product of attempted improper hindsight reconstruction, without reasoning clearly supporting the modification.

Similar considerations apply to Claims 9, 17 and 18.

Claim 20:

Claim 20 is drawn to a multi-pass diagnostic print mode mask for visual detection of poor media advance calibration in an ink-jet printing system including a printhead having a nozzle array, wherein a plurality of carriage passes are employed to print the area subtended by a printhead nozzle array, the diagnostic print mode mask comprising a rectilinear grid of pixels and a row width of w pixels, with each pixel location having a number associated therewith, the number representing the pass in which the pixel will be printed, and wherein said different areas include a first set of pixels on a row of said grid, and a second set of pixels on said row, and wherein said first set of pixels is printed on a different pass than said second set of pixels is printed, wherein said diagnostic print mode mask defining that the first w/2 pixels in the row are printed in the same pass (a_i), and the last w/2 pixels in the row are printed in another pass (b_i).

Neither Gast nor Dunand disclose a diagnostic print mode mask as recited in Claims 20-21.

The Examiner alleges that Yen discloses a diagnostic print mode mask, referring to FIG. 6 of Yen. However, FIG. 6 appears to show a print mask which is used during normal printing, and not a diagnostic print mode mask as recited in Claim 20. A prima facie case of obviousness has not been established, and the rejection of Claim 20 should be withdrawn.

Similar considerations apply to Claim 21.

The Rejection of Claims 6, 15 and 22

These claims have been rejected as being unpatentable over Gast in view of Dunand and Takagi. This rejection should be reversed, on the grounds that a prima facie case of obviousness has not been established, and the references do not teach or suggest the claimed invention.

Claim 6:

Claim 6 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

checking for printhead health and taking any corrective needed action to recover nozzle health;

during a diagnostic mode in which normal printing jobs of the printing system are not printed, printing different areas of a diagnostic pattern at different passes of one or more ink-jet printheads with a controlled amount of media advances between the passes, to accumulate media advance error between the printing of the different areas; and

examining the diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

Gast and Dunand have been addressed above. Neither reference describes checking for printhead health and taking any corrective needed action to recover nozzle health.

Takagi describes a recording apparatus to perform complementary recording to eliminate a white streak caused by recording elements becoming incapable of recording. Preceding printing, abnormal nozzles are detected, and data related to the abnormal nozzles are removed. One scan printing is performed in accordance with such data. Preceding the returning operation of the printing head subsequent to the one scan, a sub-scanning operation is performed so that normal nozzles are positioned in a location corresponding to the white streak appearing in the one scan printing. While returning the printing head, the printing is performed in accordance with such data related to the abnormal nozzles detected at the time of one scan, hence executing a complementary recording appropriately. (Takagi, Abstract)

Takagi thus has nothing to do with the problem of poor media advance calibration in an ink-jet printing system. Instead, Takagi addresses a case in which a nozzle of the printhead is not printing normally. The diagnostic mode of Takagi does not print different areas of a diagnostic pattern at different passes with a controlled amount of media advance between the passes, to accumulate media advance error. Nor is there any teaching in Takagi to examine a diagnostic pattern to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

The Examiner states that it would have been obvious to modify "the printing process disclosed by Gast, as modified, such that including the step of entering diagnostic mode that checks printhead health and takes any corrective needed action as disclosed by Takagi et al. The motivation of doing so is to provide a liquid discharge apparatus capable of obtaining the desired result of discharges without any defects even when non-discharge or another malfunction occurs in the discharging means as taught by Takagi *(column 3, lines 60-65)*." (Page 7 of Office action) Appellants respectfully disagree.

Modifying Gast, as modified, with teachings of Takagi would at most result in a printing system with a diagnostic mode having an abnormal nozzle detection scheme, and using a sub-scanning operation to fill in white streaks caused by the abnormal nozzle. The diagnostic method of Claim 6 still does not result from the purported modification.

Claim 6 is even further distinguished from the combination of Gast, Dunand and Takagi because Takagi does not take any needed corrective action to recover nozzle health. The Examiner asserts that Takagi teaches corrective action to recover nozzle health prior to printing, stating that removing data related to abnormal nozzles recovers nozzle health. Appellants disagree; removing the data related to abnormal nozzles does not recover the nozzle health; rather this action merely results in the abnormal nozzles not being used.

Claim 15:

Claim 15 is drawn to a diagnostic method for visual detection of poor media advance calibration in an ink-jet printing system, comprising:

providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

entering a diagnostic multi-pass print mode;

checking for printhead health and taking any corrective needed action prior to printing a diagnostic pattern;

printing different areas of the diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the passes to accumulate media advance error between the printing of the different areas; and

examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

The rejection of Claim 15 should be reversed for the reasons discussed above regarding Claim 10, and further because the applied references do not teach or suggest "checking for printhead health and taking any corrective needed action prior to printing a diagnostic pattern" as discussed regarding Claim 6.

Claim 22:

Claim 22 is drawn to a diagnostic method for improving print quality in an ink-jet printing system, comprising:

providing an ink-jet printhead mounted on a carriage, the carriage mounted for movement along a scan axis;

providing a media advance system for advancing a print medium along a media path which is transverse to the scan axis;

entering a diagnostic multi-pass print mode;

determining whether the nozzle array has good health;

if the nozzle array has good health, printing different areas of a diagnostic plot at different passes using said ink-jet printhead with a controlled amount of media advances between the passes to accumulate media advance error between the printing of the different areas; and

examining the diagnostic plot to determine whether the accumulated media advance error is sufficiently objectionable to take corrective action.

The rejection of Claim 22 should be reversed for the reasons discussed above regarding Claim 10, and further because the applied references do not determine whether the nozzle array has good health, and if the nozzle array has good health, printing different areas of a diagnostic plot as recited in Claim 22.

IV. SUMMARY

The rejections under 35 USC § 103 must be reversed. A prima facie case of obviousness has not been made, and the cited references do not teach or suggest the claimed invention.

Respectfully submitted,

Dated: 4-8-2005

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